

In Memoriam

Dr. Judson S. Swearingen

(11 January 1907 - 5 September 1999)

A man of many talents, a remarkable entrepreneur, and a consummate mentor,

Dr. Judson Swearingen was founder of Rotoflow Corporation and a pioneer in the area of turboexpander machine design and application. Born in San Antonio, Texas, and raised on the Pease League cattle ranch south of there, he began his education at Oak Island United Methodist Church School. He rode his mustang horse to the one-room schoolhouse, where he received an excellent education, unhampered by grade-level expectations. His memorial service was held at that same location, Oak Island United Methodist Church, and that is his final resting place.

His early life on the ranch provided him with varied experiences. When he was six, his father let him steer their Model T; by the age of eight, he “soloed” it (seven miles round trip) to take gasoline and oil to the water pump — auxiliary and back-up for the windmill. His love of chemistry developed at the age of eleven, when an older acquaintance gave him his own high school chemistry text. “Within a year, I had read and learned virtually everything in it,” states Swearingen in a letter to his aunt. Learning to weld on his family’s ranch as a youngster, he also worked as a blacksmith, which undoubtedly influenced his keen mechanical aptitude.



Dr. Swearingen, left, receiving the Hanlon Award in 1974.

As a result of spinal injuries after a fall, his father sent him to Texas Chiropractic College at the tender age of fourteen, finding it “less expensive to put him through the College than to pay for his adjustments.” Judson became a licensed chiropractor at age seventeen. He then put himself through St. Mary’s in San Antonio and the University of Texas, Austin (where he earned three degrees in Chemical Engineering: B.S., 1929; M.S., 1930; Ph.D., 1933), by doing chiropractic work on ranch hands and field workers.

Early the entrepreneur, he formed and operated a three-partner consulting firm to the oil companies during the time he was working on his master’s and doctorate degrees. The partners constructed (with their own labor) a small thermal cracking plant for making anti-knock gasoline and also operated a small chain of gas stations.

He was a professor of Chemistry and Chemical Engineering at the University of Texas, Austin, when he was asked to be a part of the Manhattan Project for the development of the atom bomb. With responsibility for pump design and seal research used in the uranium separation process, he became one of

several key scientists that made the project a success, which ultimately led to the Allies’ victory in WWII.

After the war, Dr. Swearingen was sent by the War Department to Germany to study the German atomic energy operations. When he returned, he became a senior scientist at the newly formed Southwest Research Institute in San Antonio.

Judson moved to Los Angeles in 1959 and started Statham-Swearingen, a manufacturer of refrigeration products, with a college friend, Louis Statham. According to the understandings of Patrick “Harry” Swearingen, a distant cousin and professional advisor, “the business developed well, based on the processes they developed and patented.”

After the sale of the business, Dr. Swearingen focused his sights on Rotoflow Corporation, a “skeletal” operation begun in San Antonio in 1946. It wasn’t until 1961, when he moved it to Los Angeles and turned his full attention to it, that Rotoflow began to flourish. His widow, Luta Swearingen, states, “He was a hands-on manager and always present to oversee operations, engineering, and to attend personally to the needs of the customer.” Although the first radial inflow expander (now known as the turboexpander) was developed in Germany in 1936, Dr. Swearingen is credited with being the designer and installer of this machine in natural gas applications in 1962, thus making it commercially successful. He was the owner and president of his company until 1990, when

Atlas Copco acquired Rotoflow.

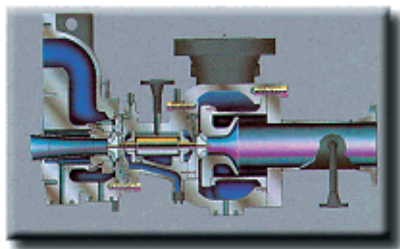
Don Bently, Founder, Owner, Chairman, and Chief Executive Officer of Bently Nevada recalls traveling to see Dr. Swearingen a number of years ago. Although Bently had not previously met Swearingen, he initiated the visit based on his belief that Swearingen had a "genius-level feeling for machine behavior" that would help him (Bently) in his understanding of fluid-induced instabilities in machinery. "He showed caution at first in talking to strangers," recalls Bently, "but possessed excellent understanding of fundamental instability behavior." Swearingen's work on the Manhattan Project also made a lasting impression on Bently, who notes that Dr. Swearingen "is the person generally given credit for the principal process used to separate U_{235} from U_{238} ."

According to Roger Harker, Bently Nevada's President and Chief Operating Officer, Rotoflow was one of the early pioneers in the utilization of Bently Nevada's probes, using them in their cryogenic (very low temperature) turboexpanders and compressors for both hydrocarbon processing and air separation. He observed that both companies and their founders had similar values: technical excellence, high quality products, value for a dollar, products to last a lifetime, and the belief that form follows function.

Mr. Harker visited Rotoflow about a dozen years ago, and he noted that Dr. Swearingen was very dedicated to his work, keeping an apartment with a kitchen in the plant so that guests could be entertained without taking an excessive amount of time away from work. He also noted that old machines were still operating in the plant, and that the right machine was used for each job, similar in spirit to Bently Nevada's "enlightened use of resources."

Dr. Swearingen's many admirers include those who worked with him at Rotoflow. Reza Agahi, who worked with Judson for seventeen years, remembers, "He kept an organized file and records of all the works he had done over more than 70 years." ... "His pioneering works, over one hundred mechanical and natural gas/hydrocarbon processing patents, and numerous articles, led the way to a technology that is an inseparable part of the gas processing industry."

Michael Kotlyar, an immigrant from Russia who worked at Rotoflow with Dr. Swearingen for four years, said that if he had known how much he would learn from Swearingen, he would have



A hydrocarbon processing turboexpander.

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had no need to go to college. By working alongside this great man, he learned much more than a college education could provide. He states, "Doctor's philosophy was, 'At the end of every day you need to know what have you done today.'" Kotlyar also said, "He was the greatest man I've ever known."

Robin Dakin, who first met Judson in 1975, reminisces, "He told me one time, that if a piece of machinery could not stand the oil rig test it was no good. I asked him what an oil rig test was, and he laughed and said, 'Well, you take it up to the top of an oil rig and drop it.'" To stand up to oil field treatment, Swearingen developed a bearing nine times stiffer than conventional

bearings. It greatly simplified numerous machine design, manufacturing, and installation challenges. It reduced the sensitivity of the machine to unbalance and avoided fluid instability problems. Dakin concludes, "Possibly the real mark of the very able is their ability to keep it simple and see and create simplicities that slice through all the confusion. Dr. Judson S. Swearingen had this ability in abundant measure."

He was a Fellow of the American Institute of Chemical Engineers, a member of the American Chemical Society, ASME, United States National Academy of Engineers, and Mexican National Academy of Engineers. He was the recipient of the Hanlon Award from the Gas Processors Association in 1974 of which he was extremely proud. He received a Citation from the U.S. Secretary of War in 1945 for his work on the Manhattan Project. He was co-author of *Compressors and Expanders*, published in 1982 by Marcel Dekker, Inc., and the author of numerous articles.

Although his was not a household name, due to his private nature and the specialization of his field of work, Dr. Swearingen was surely an influential person of the 20th century. Truly a genius and a remarkable man, he will be missed by friends, family, and business associates. ☺

Contributors, listed in alphabetical order: Reza Agahi, Marketing Manager, Atlas Copco Rotoflow; Don Bently, Founder, Owner, Chairman, and CEO, Bently Nevada Corporation; Robin Dakin, Chairman, Design Review, Atlas Copco Rotoflow; Roger Harker, President and COO, Bently Nevada Corporation; Michael Kotlyar, Senior Staff Engineer, ARCO; Luta Swearingen, widow of Dr. Swearingen; Patrick "Harry" Swearingen, attorney, Matthews & Branscomb.

For information on his family, a more detailed look at his role in the Manhattan Project, and interesting anecdotes from his friends, check our online version of the ORBIT at www.bently.com.